OPERATING INSTRUCTIONS

This section provides the user with a reference of the keypad accessible programming features of the Technisonic TDFM-136 VHF FM Digital Transceiver.
This section is divided into subsections as follows:

2.1	command structure overview and terms
2.2, 2.3, 2.4 and 2.5	detailed command descriptions by level
2.6	detailed operating description

2.1 Command Methodology

This section describes how the TDFM-136 command structure is organized.

Command Levels

In order to accommodate the necessary commands, the commands have been divided into different levels, each command level has up to 12 commands numbered 0-9, # and *; the zero (0), and the ESC (*) key are functions for every level, they allow the user to move between levels as follows:

0 PROG	step up through command levels

* ESC	step down through command levels

When stepping through command levels, the indicated level is shown in subscript in the 4th character position on the lower line of the display. Note that this display position is left blank for the default level (level1). Table 2-1 shows the command levels and the associated display character.

Table 2-1. Command Levels	
Level	**Display**
Operator L1	blank
Operator L2	'2'
Operator L3	'3'
Maintenance L4	'4'

Figure 2-1 below shows the front panel display for different Command levels.

0	0	1		M	a	i	n				D	1	3	6	.	0	0	0	0	R	g
G	D	2	₃	G	u	a	r	d	2		w	1	7	4	.	0	0	0	0	R	t

Figure 2-1. The User Screen showing the Command Level Display Position

In addition to the 3 Operator available command levels, the unit can be put into a mode that allows access to a 4th command level (Maintenance). This command level (L4) is to allow authorized personnel to set operating policy for the radio through use of 'Permissions'. These are explained in section 2-8. *This command level should NEVER be enabled in flight.*
In order to restrict access to the L4 command level, the side cover must be removed, and a maintenance jumper must be installed on the MCU board (see section 2-6).

Command Types

There are two basic command types: Inherent and Edit. An **Inherent** command is one that requires no additional input from the user, such as the 'memory brightness' or 'scroll memory' commands. An **Edit** command requires further input from the user.

Command Scope

Most, but not all, edit commands can affect either the Main or the Guard Channel. The channel to be edited depends on the position of the **MN/GD** and the **G1/G2** front panel switches. In this manual, the scope of the command is given on the command title line as follows:

(MN/GD)   for a command that is valid in both Main and Guard,
(MN)   for a command that is valid for Main only
Blank   for a command that is not subject to channel restrictions.

Command Conventions

After selecting the command, the system expects further input from the user. All edit commands may be terminated in the same way:

| # ENTER | accept the entry and return |
| * ESC | abandon the entry and exit |

The commands that allow the user to choose an option from a list, will always use the up/down arrows: key2 and key8 to step UP and DOWN – respectively - through the available choices. In addition, the key that was used to *enter* the function can be used to step UP through the available choices.

Example: the L1-3 Mode command allows the user to select the radio's operating mode (analog wide, analog narrow, or P25 digital). Once the user has selected the command they can press ⌈2⌉ and ⌈3 MODE⌋, to step up, or ⌈8⌋ to step down through the choices. The advantage of the 'entry key' step method is that the user does not have to move their finger to a different key to make the choice once the command has been selected.

Command Reference

Table 2-2 below shows the commands divided into command levels: one, two, three, and four.

Key	Operator Level 1	Operator Level 2	Operator Level 3	Maintenance Level 4
Table 2-2. Command Level Reference				
1 CHAN	Select Main Memory	Program New Memory	Select Boot Memory	Set Default Record
2 up	Display – Brighter	Copy Guard to Main	n/u	n/u
3 MODE	Edit Mode	Lock Keypad	Select HEX/Decimal Edit	Set Cmnd Permissions
4 back	Scroll Memory Down	n/u	Display Software rev	n/u
5 SCAN	Scan ON/OFF	Edit Scan	Set Scan Parameters	n/u
6 fwd	Scroll Memory Up	Edit Description	Set PTT timer	n/u
7 FREQ	Edit Frequency	Create Shadow Channel	Set Side tone Audio	n/u
8 down	Display – Dimmer	Copy Main to Guard	PC Communications	n/u
9 SQL	Edit Squelch	Set Unit ID	Display Squelch Values	Set SQL Permissions
0 PROG	Go to next level	Go to next level	Go to next level	n/u
# ENTER	n/u	n/u	n/u	n/u
* ESC	n/u	Go to Previous level	Go to Previous level	Go to Previous level

Level 1 commands are a mix of operating and editing commands.
Level 2 commands are a mix of operating, editing, and configuration commands.
Level 3 commands are configuration commands.
Level 4 allows qualified personnel to configure access permissions for the radio.

NOTE: NEVER fly the radio with level 4 commands enabled. This command level is for maintaining the radio only, the radio may not respond in real time, or as expected when the Maintenance level (level 4) is enabled!

NOTE: n/u indicates command keys that are not currently implemented.

2.2   Operator Level 1 Commands

This section lists the commands available to the user in Level 1. The availability of the commands is subject to the restrictions set by the Permissions policy (see 2.8, L4-2).

L1-1. Select the Operating Memory for the Main Channel (MN)

This command allows the user to select the MAIN channel that the radio is operating on. Upon selecting this command the cursor will appear at the first digit in the channel number as shown:

0	0	0																	
E	n	t	e	r		N	u	m	b	e	r		(	0	-	9	,	#	*	)

Figure 2-2. The User Screen to Enter a Memory Number

Now, select a number from 001 to 230 as follows:

[0 PROG] to [9 SQL]   decimal mode: enter number, cursor automatically advances

[# ENTER]   accept the entry and return

[* ESC]   abandon the entry and exit

Note: If the channel number selected is out of range then the cursor will remain until the user enters a valid number. If there is no information programmed for the channel, the editor will return to the previously displayed channel.

L1-2. Increase Display Brightness

Press and hold the up arrow (2) key to increase the brightness of the LED display, it stops at maximum.

L1-3. Edit Channel Operating Mode (MN/GD)

This command will edit the Operating Mode of the selected channel. Upon selecting this command the cursor will appear at the MODE position.

0	0	1		M	a	i	n					D	1	3	6	.	0	0	0	0	R	g
E	d	i	t		M	o	d	e		(	↑	↓	3	,	#	*	)					

Figure 2-3. The User Screen to Edit the Operating Mode

You may now edit the Operating Mode as follows:

[3 MODE] [2] [8]   step through the available entries

[# ENTER]   accept the entry and return

[* ESC]   abandon the entry and exit

Table 2-3 shows the available Operating Modes.

Table 2-3 Channel Operating Modes	
Operating Mode	Indicator
Analog Wide (25 kHz)	'w'
Analog Narrow (12.5 kHz)	'n'
Digital (12.5 kHz)	'D'

Note: If an Operating Mode is selected that is incompatible with the current Squelch Mode, then the Squelch mode will automatically be changed to one that is acceptable for that Operating Mode (ie 'x' for analog, 'm' for Digital Rx and 'g' for Digital Tx).

⟨4⟩ L1–4. Scroll Backwards through Available Memories

This command will scroll the Main Channel BACK, or down, through the programmed memories until reaching the lowest memory programmed, it will then wrap around and restart from the top. Once the user releases the button the displayed characteristics will be programmed. The scroll speed will increase as the button is held.

[5 SCAN] L1-5. Start/Stop Scan (MN)

This command allows the user to start and stop Scan operation, the system will scan the channels that are in the same scan list that the currently displayed Main channel is a member of. Note that the channels in the scan list must have scan enabled (see command L2-5) to be scanned. If the memory scan has been enabled then the following screen appears:

0	0	1	₁	M	a	i	n				D	1	3	6	.	0	0	0	0	R	g
G	D	1	∩	G	u	a	r	d	1		n	1	5	4	.	0	0	0	0	R	t

Figure 2-4. The User Screen During Scan

Once scan has started the scan list digit flashes to indicate that the unit is in SCAN mode. Also note that the key level indicator position has the lock symbol (∩, this indicates that all keypad keys are disabled except for:

[5 SCAN] [* ESC] stop scan

⟨2⟩ ⟨8⟩ display brightness

Front panel switch operation is modified as well: operation of **MN/GD** or **G1/G2** *will terminate scan* and restore normal operation of keys and switches. The front panel **Squelch** button is disabled. The **HI/LO** power switch is unaffected.

If the user tries to start scan on a channel or memory that doesn't support scan, you will see:

0	0	1		M	a	i	n						D	1	3	6	.	0	0	0	0	R	g
E	r	r	o	r	:		N	o	n	-	S	c	a	n	n	e	d		C	h	a	n	

Figure 2-5. Selecting a Memory/Channel that Doesn't Support Scan

L1-6. Scroll Forward through Available Memories (MN)

This command will scroll FORWARD, or up, through the programmed channels, scroll speed will increase as the button is held and the scroll will wrap around and restart from the bottom. Once the user releases the button the displayed characteristics will be programmed.

L1-7. Edit Channel Operating Frequency (MN/GD)

This command allows the user to edit the **Operating Frequency** of the selected channel. The frequency will be edited in duplex mode: first Receive, then Transmit. Once the receive parameter is entered, the 2nd last chartacter in the display will switch from "R" to "T", the user can now enter the transmit value. Note that the receive value is automatically entered, so to get simplex operation, simply accept this entry. The edit screen appears as follows:

0	0	1		M	a	i	n						D	1	3	6	.	0	0	0	0	R	g
E	d	i	t		F	r	e	q	u	e	n	c	y		(	0	-	9	,	#	*	)	

Figure 2-6. The User Screen to Edit the frequency

Upon start, the cursor appears at the second character in the Frequency field of the channel to be edited. The user may now enter the desired operating frequency as follows:

0 PROG to 9 SQL   decimal mode: enter number, cursor automatically advances

\# ENTER   accept the entry and return

* ESC   abandon the entry and exit

The editor will not accept a value outside the limits of 136.0000 MHz. to 174.0000 MHz. In addition frequency selection is limited to 2.5 kHz increments in all Operating modes.

L1-8. Decrease Display Brightness

Press and hold the down arrow (8) key to decrease the brightness of the LED display, it stops at minimum.

9 SQL L1-9. Edit Channel Squelch Mode (MN/GD)

This command will edit the **Squelch Mode** of the selected channel, and then allow the user to edit the associated Squelch Mode Value. As with the Frequency Edit function above, the Squelch Edit is in duplex mode, Receive followed by Transmit. The edit screen appears as follows:

| 0 | 0 | 1 | | M | a | i | n | | | | D | 1 | 3 | 6 | . | 0 | 0 | 0 | 0 | R | g |
| E | d | i | t | | S | q | l | | M | o | d | e | | (| ↑ | ↓ | 9 | , | # | * |) |

Figure 2-7. The User Screen to Edit the Squelch Mode

Upon start, the cursor appears at the Squelch Mode indicator position of the channel to be edited. The user may now select the desired Squelch mode from the list, as follows:

[2↑] [9 SQL]   step up through available Squelch modes (see table below)

[8↓]   step down through available Squelch modes

[# ENTER]   accept the entry and return

[* ESC]   abandon the entry and exit

The available options are constrained by the operating mode, that is, different Squelch Modes are available for the analog Operating Modes (wide and narrow) than for the P25 operating mode. See the table below.

Table 2-4. Receive and Transmit Squelch Modes							
Analog	**Rx**	**Analog**	**Tx**	**Digital**	**Rx**	**Digital**	**Tx**
Noise	Rx	None	Tx	TalkGroup + NAC	Rg	TalkGroup + NAC	Tg
CTCSS Tones	Rt	CTCSS Tones	Tt	NAC Only	Rn	ID Call	Ti
DCS Code	Rc	DCS Codes	Tc	Monitor	Rm	Inhibit	T-
		Inhibit	T-				

Once the Squelch Mode has been selected, the user will be allowed to edit the value of the selected mode (subject to restrictions imposed by the Squelch Permissions – see L4-3). The Squelch Modes that may be edited are: Noise, CTCSS Tones, and DCS Codes for analog operating modes, and TalkGroup, NAC, and ID Call for digital operating mode.

L1-9.1 Edit Noise Squelch Value

Scope: analog only, receive only, range 0-16 ($0-$F)

If Noise (Rx) is chosen, the prompt line will display the current value for noise squelch level and place the cursor on the first digit available for the user to edit:

| 0 | 0 | 5 | | T | e | s | t | | | | n | 1 | 5 | 6 | . | 0 | 0 | 0 | 0 | R | x |
| N | o | i | s | e | | L | e | v | e | l | : | | | | | | | | | 1 | 0 |

Figure 2-8. The User Screen to Edit the Squelch Value

The user may edit the Noise Squelch value as follows:

[0 PROG] to [9 SQL]   decimal mode: enter number, cursor automatically advances

[# ENTER]   accept the entry and return

[* ESC]   abandon the entry and exit

L1-9.2 Select CTCSS Tone

Scope: analog only, receive & transmit, 42 tones (67Hz to 254.8Hz)

If CTCSS Tones are chosen, the prompt line will display the current value for that tone:

| 0 | 0 | 5 | | T | e | s | t | | | | | n | 1 | 5 | 6 | . | 0 | 0 | 0 | 0 | R | t |
| C | T | C | S | S | | T | o | n | e | | (| ↑ | ↓ | , | # | * |) | : | | 6 | 7 | . | 0 |

Figure 2-9. The User Screen to Edit the CTCSS Tone Value

The user may select from the available tones (Appendix A lists the available choices), as follows:

[2↑] [8↓]   step up/down through available CTCSS Tones

[# ENTER]   accept the entry and return

[* ESC]   abandon the entry and exit

L1-9.3 Select DCS Code

Scope: analog only, receive only, 83 codes (23 to 754)

If DCS Codes are chosen, the prompt line will display the current value for that code:

| 0 | 0 | 5 | | T | e | s | t | | | | | n | 1 | 5 | 6 | . | 0 | 0 | 0 | 0 | R | c |
| D | C | S | | C | o | d | e | | (| ↑ | ↓ | , | # | * |) | : | | | | 2 | 3 |

Figure 2-10. The User Screen to Edit the DCS Code Value

The user may select from the available choices (Appendix A lists the available choices), as follows:

[2↑] [8↓]   step up/down through available DCS Codes

[# ENTER]   accept the entry and return

[* ESC]   abandon the entry and exit

L1-9.4 Edit Project 25 Talkgroup Value

Scope: digital only, receive and transmit, range 0-65535 ($0000-$FFFF)

If the P25 TalkGroup was chosen the, the prompt line will display the current TalkGroup value, the cursor will be on the first digit:

0	0	1		M	a	i	n					D	1	3	6	.	0	0	0	0	R	g
P	2	5		T	a	l	k	G	r	o	u	p	:					0	0	0	1	

Figure 2-11. The User Screen to Edit the P25 TalkGroup Value

This parameter may be edited in either HEX or in Decimal (see command L3-3). The edit keys are as follows:

8 / 2   hex edit: step up/down through hex digits (0-9, A-F)

4 / 6   hex edit: move cursor forward / backward

0 PROG to 9 SQL   decimal mode: enter number, cursor automatically advances

ENTER   accept the entry and return

* ESC   abandon the entry and exit

Note: If P25 Talkgroup was chosen, the editor will drop into Edit NAC upon accepting the Talkgroup value.

L1-9.5 Edit Project 25 NAC Value

Scope: digital only, receive and transmit, range 0-4095 ($000-$FFF)

If the P25 NAC was chosen (or after entering the P25 TalkGroup) the prompt line will display the current NAC value, with the cursor on the first digit:

0	0	1		M	a	i	n					D	1	3	6	.	0	0	0	0	R	n
P	2	5		N	A	C	:												0	0	1	

Figure 2-12. The User Screen to Edit the P25 NAC Value

This parameter may be edited in either HEX or in Decimal (see command L3-3). The edit keys are as follows:

8 / 2   hex edit: step up/down through hex digits (0-9, A-F)

4 / 6   hex edit: move cursor forward / backward

0 PROG to 9 SQL   decimal mode: enter number, cursor automatically advances

ENTER   accept the entry and return

* ESC   abandon the entry and exit

L1-9.6 Edit Project 25 ID Call Value

Scope: digital only, transmit only, range 0-9,999,999

If the P25 ID Call was chosen, the prompt line will display the current ID Call value. This parameter may only be edited in decimal, as follows:

0	0	1		M	a	i	n					D	1	3	6	.	0	0	0	0	T	i
P	2	5		C	a	l	l		U	n	i	t		#	:		0	0	0	0	0	0	1

Figure 2-13. The User Screen to Edit the P25 ID Call Value

This transmit only mode allows the user to try to contact a specific radio by transmitting that radio's user ID. If no radio has that ID then this will fail.

The keys used to edit the ID call parameter are:

[0 PROG] to [9 SQL]   decimal mode: enter number, cursor automatically advances

[# ENTER]   accept the entry and return

[* ESC]   abandon the entry and exit

[0 PROG] L1–0. Command Level Up

This key selects the next HIGHER Command Level, the Command Level is indicated by a subscript digit in the 4th character position on the lower row of the display. See table 2-1.

Upon pressing this key, the radio will remain in the new Command Level for 5 seconds, if there is no further user input within this time then the radio will revert to Level 1. The Direct Command Level (level 1) is the normal operating mode for the radio and is indicated by a blank space.

[# ENTER] L1-#. Not Used.

[* ESC] L1-*. Not Used.